

A Graceful Chest of Drawers

TEXT AND PHOTOS BY RICHARD JONES

I've been developing a range of furniture specifically for display in galleries and furniture shows, and this cabinet in American cherry, walnut, and hard maple is an example. Large pieces have their place in shows, but there are assembly, packing, set-up, and transportation considerations, and large items can dominate your space. Smaller furniture is easier to handle and arrange. Modestly-sized pieces illustrate style and proficiency, are saleable, and can generate commissions.

Designing for shows is both liberating and restricting; you can make anything you like, but will anyone else appreciate it? In this case, apart from the leg form, there were no design limitations, but I have found it helpful to imagine a realistic end use. This forces concentration on the job at hand and discourages flights of fancy which, if they do occur, can be filed in the "some other time" category.

General proportions—width, depth, and leg profile—were resolved first. The leg style was the design motif that inspired the piece, and had already been used in tables and chairs, but this was my first use of it in a cabinet. The inside face of the legs was kept straight to reduce drawer, or door, fitting problems. Doors were rejected, because without hinge limiters, opened doors would hit the leg. Drawers and/or tambour or a flipper were possible choices, and drawers were finally chosen because people always welcome extra drawer space.

With the general parameters settled—a nest of drawers in a free-standing cabinet—detailing was next. How many drawers, and how should they move? Hidden or exposed drawer dividers? Manufactured drawer slides? Attached or integral drawer fronts? Exposed dividers were ruled out to reduce the quantity of cluttered horizontal lines. Manufactured full-extension drawer slides were chosen, selecting a Hafele undermount-type



The author used refined graceful curves and thoughtful attention to proportions to create this chest of drawers in cherry and walnut.

because they are quite inconspicuous and allow the drawer to fill most of the internal cabinet width. There are always arguments for and against manufactured slides, but I concluded they were a good choice here.

The next choice is how many drawers to incorporate, and eight drawers were chosen, with the top drawer front $3\frac{1}{8}"$ tall, so that its bottom edge coincided with the leg's shoulder. The choice was made to graduate the height of the fronts incrementally, each front a consistent amount greater than the one above it.

If the incremental height increase had not suited, a drawer could have been removed or added, or the height of the top drawer front adjusted and some recalculating done.

The drawer fronts join the drawer sides with sliding dovetail housings, and hand-cut dovetails at the back. To provide a drawer stop, a $\frac{1}{2}"$ reveal is incorporated at the joint of the leg to the side panel. The reveal also allows the back panel to fit quite simply. Other details include curved elements to complement those in the outside face of the leg, such as the bottom $\frac{1}{4}"$ or so of the inner faces of the legs, the bottom edge of the lower front rail, and the bottom edge of the two sides. The top has a shallow bevel worked on the underside to show a slim edge.

Considering visible hardware requirements at the design stage is important, for it prevents giving the impression that pulls are an afterthought. "Design from the handles back," to quote a well-known designer. Early in the design process it was decided that manufactured pulls would be used, and a few possibilities selected. The choice was narrowed to one pattern, available in four colors, the final choice dependent upon the wood species used for the drawer front. The handles were selected to complement the curve at the top of the leg.

Some flexibility at the design stage allows for small changes to be made in a piece's final appearance, the techniques used, and wood selection. The original design called for the carcass sides and bottom to be made of cherry-veneered plywood, the bottom of a piece of $\frac{3}{4}"$ ply. The sides were to use the same $\frac{3}{4}"$ ply, but it would be glued to two pieces of $\frac{1}{4}"$ ply to make $1\frac{1}{4}"$ thickness. Solid edging front and back would hide the plywood

edges. When it came to material selection in the workshop, the plan changed. Items H, J, and K in the materials list were replaced by solid wood, and at G, only the $\frac{1}{2}" \times 1"$ back channel strip was needed. There was plenty of solid stock on hand, and plywood often doesn't polish up the same as solid wood without staining and tinting of the polish.

In specifying material dimensions for

I used the following method to determine my drawer proportions:

1. Number of drawers = 8
2. Top drawer front height = $3\frac{1}{8}"$
3. Every drawer front height must be greater than $3\frac{1}{8}"$, therefore calculate, $3\frac{1}{8}" \times 8 = 25"$

4. To find the incremental height increase of each drawer front, subtract this 25" from the vertical height available, i.e., $35\frac{1}{2}"$. Therefore, $35\frac{1}{2}" - 25" = 10\frac{1}{2}"$

5. Find the number of increments (I) in a stack of drawers.

1st drawer =	+ 0.1
2nd drawer =	+ 1.1
3rd drawer =	+ 2.1
4th drawer =	+ 3.1
5th drawer =	+ 4.1
6th drawer =	+ 5.1
7th drawer =	+ 6.1
8th drawer =	+ 7.1

Total I (increments) = 28

There are 28 equal increments (I) to divide into $10\frac{1}{2}"$. Calculate, $10\frac{1}{2}" / 28 = 3/8"$. Each drawer front is $3/8"$ taller than the one above, i.e., $3\frac{1}{8}"$, $3\frac{1}{2}"$, $3\frac{7}{8}"$, etc.

6. However, this assumes no gap between any of the drawers. I could either subtract a small amount ($1/32"$ or less) from the height of each drawer front, or I could choose to increase the opening a small amount to preserve these easy numbers. I decided to increase the opening to $3/8"$, spreading the extra $1/2"$ across the nine gaps.

most furnituremaking projects, it's easy to calculate exactly what's needed for the main carcass elements, but drawer parts, for instance, can often only be reckoned approximately, and are therefore given generous nominal sizes.

In using the cutting list, go through your wood and decide where to make cuts so as to get the best utilization. Mark the parts as they are located with letters

that correspond to the materials list, and make a reciprocal note on the list. Regard, as a minimum, the last 2" at both ends of a board as waste because the ends of boards tend to dry rapidly and are unlike the rest of the plank. Also, because of the different drying pattern, there is the possibility of hidden end shakes. Additionally, if there are readily visible shakes evident at the ends, allow at least another 2" as waste. Cut around any shakes in the middle of a board's length by 2". Generally, cut rough wood at least 4" longer than the required finished length to allow for planer snipe, etc. Gang together short and/or narrow pieces into one and trim to size later; e.g., three pieces to finish at 12" long might come out of one piece about 40" long.

If the choice of wood species has been left flexible, make decisions now. Decide if some or all the parts should come out of either quartersawn or plainsawn material, depending upon the design; quartersawn should be selected if stability is a concern. However, a possible drawback of quartersawn wood is that the grain pattern is usually straight and plain, which may not be suitable aesthetically. Quartersawn oak is one notable exception where this cut reveals prized "ray fleck." Like everything else in furniture-making, wood selection is a compromise.

All the wood should be cut, jointed on the face and edge, and thickened as required. Parts not immediately needed, such as the drawer parts, should be left long, wide, and a little thick. Ideally, stack and sticker these parts somewhere indoors until needed. This gives the parts some time to acclimatize to typical interior conditions. (My workshop, for instance, has no climate control.) Sometimes a good strategy is to clamp the pile or piles together if stability is a concern. This doesn't always work, but it often helps to maintain flatness.

CARCASS CONSTRUCTION

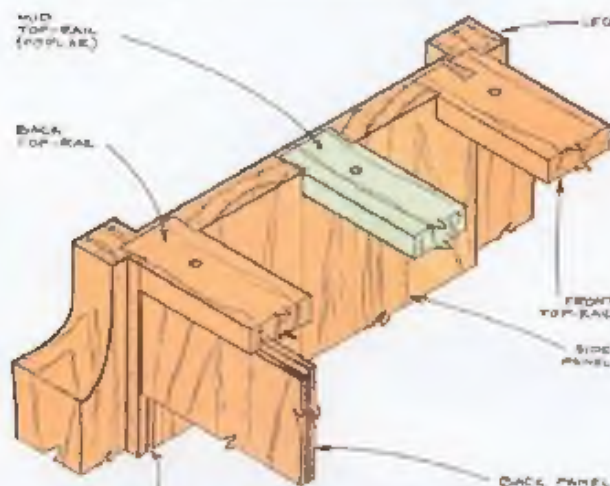
Typically, the order of work when making cabinets is to concentrate on making the basic carcass, then fit internal parts to suit. In a cabinet like this, this means the legs and sides, the cabinet bottom, the bottom front rail, and the three top rails. In addition, the top, of glued-up planks, can also be made at the beginning.

To make the work less complicated,

A	legs—cherry	4 @ 2½" x 2¾" x 45½"
B	top—cherry	1 @ ¾" x 18½" x 24"
C	top rails—cherry	2 @ ¾" x 2¾" x 19½"
	top rail—poplar	1 @ ¾" x 2" x 19½"
D	lower front rail—cherry	1 @ ¾" x 2½" x 19½"
E	drawer fronts—walnut	4 @ ¾" x 18" x 3¼"/3½"/3¾"/4¼"
F	drawer fronts—walnut	4 @ ¾" x 18" x 4¼"/5"/5½"/5¾"
G	channel strip—cherry	1 @ ¼" x 1" x 37½"
H	sides—cherry	2 @ 1¼" x 12¼" x 39½"
K	cabinet bottom—cherry ply	1 @ ¾" x 12¾" x 17½"
J	back panel—cherry ply	2 @ ¾" x 17½" x 37"
M	drawer bottoms— maple veneered MDF	8 @ ¾" [size to fit]
N	drawer sides—maple	16 @ ½" [dimensions will vary]
O	drawer spacers—maple	16 [dimensioned as needed]
P	drawer slides	8 pr.
Q	drawer pulls	8



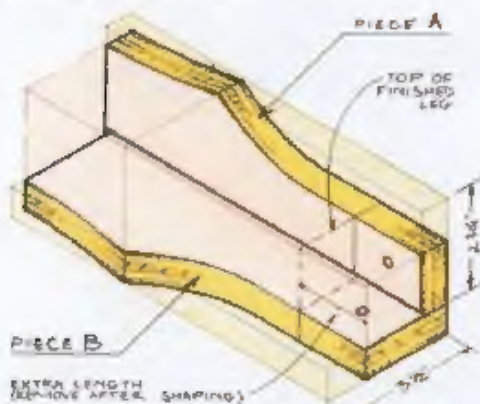
CONSTRUCTION DETAILS



CHANNEL STRIP
WITH
1/8" X 1/4" GROOVE

WOODARCHIVIST.COM

LEG SHAPING JIG



the joinery of the legs to the other parts is done while the leg blanks, rails, and panels are still square. Once joinery is completed, shaping is done. Planing jigs and templates to facilitate the shaping process is done at an early stage, because joinery and shaping operations are interrelated.

The job of edge-gluing boards for the two cabinet sides, the bottom, and the top is done first. Leave the pieces that form these panels a bit thick; e.g., the sides eventually finish at 1-1/8" thick, so leave them at 1-1/4". Prepare the edges by straightening them on the jointer and hand-planing, if required, with a #7 try plane. Biscuits or splines might be used to help with alignment, but they are not needed for strength. Glue and clamp up. After the glue has dried, joint one face and run the pieces through the thickness planer to size. If your machines are not wide enough to accommodate the wide pieces formed in one pass, work in stages. Do the last glue-up carefully to keep misalignment to a minimum, thereby reducing necessary hand-planing. Lay the top and bottom to one side, stickered up indoors like the drawer parts before, and work on joining the side panels to the legs.

The legs of this piece came from square stock, and were cut exactly 4" oversize (i.e., 47-1/2") to fit a jig that is made and used later for shaping the curves. Allocate each leg to a specific corner and note their positions. Gang the legs together on the workbench, top and bottom ends aligned and the faces to be joined to the side panels facing up. Gently clamp them together. Square a line across 2" down from the top. Measure off the finished leg length (43-1/2") and square this line across. This leaves 2" oversize at both ends. Mark the length of the panel (39-1/8") down from the top line. Mark the position for (five) biscuits along the length for the panel-to-leg joint, and strike these positions across all the legs with a sharp pencil and a square.

The next step is to use the marked legs to lay out the matching biscuits on the edges of the glued-up panels. Cut and true-up the long edges of the panels to the appropriate width (12-1/4" in this case), measure, mark, and square across the finished length (39-1/8"). Offer up the panels' edges in turn to the appropriate leg, and transfer the marks for the biscuits from the legs to the inside faces of the pan-

els. (You can add one dowel per edge to eliminate slipping along the length during glue-up, but this is not really necessary.)

Where the side panel and leg join, there is a 1/2" reveal. To create such a reveal without calculating and making adjustments to the biscuit jointer, use the following method, using the inside face of both the panel and the leg as the reference point for the biscuit jointer fence. Set the jointer to cut 13/16" down from the inside face of the panel, and cut the



slots. Then cut a piece of 1/2" MDF the same length and width as the leg. Attach the MDF with its long edge flush with the edge of the leg face to be biscuited; clamps should be fine. Transfer the biscuit marks on the leg to the top face of the MDF. Without altering the setting of the biscuit jointer, cut the slots. The offset between the leg and the side will automatically be 1/2", the thickness of the MDF. For different reveals, use a different thickness of MDF.

With this job done, the cabinet bottom can be trued up, cut to exact length, and dry-biscuit to the inside faces of

the side panels. In this cabinet, there is a bottom front rail attached to the front edge of the cabinet bottom, and this may also be dry-biscuit on, leaving this piece 2" oversize at either end.

MAKING JIGS, SHAPING THE LEGS, MORE JOINERY

Shaped legs like these can be formed by making an L-shaped cradle jig. The squared leg blank is attached to the jig and shaped on the shaper or router table fitted with a pattern-cutting bit.

To make a suitable jig, cut two pieces of 3/4" ply or MDF to 47-1/2" long, the same as the leg stock, one 2-3/4" wide (Piece A in drawing) and the other 3-1/2" wide (Piece B in drawing). Dry-biscuit



the biscuits and countersunk screws. Ensure that the faces are perpendicular to one another. Trim the outside corner flush when dry.

Drill offset countersunk screw holes in each face of the jig into what will be the extra length at the top of the leg. Repeat at the bottom end. Place the inside corner of each leg in the jig and screw them in. Trace round the jig to mark the leg. Now that the exact profile of the leg is known, the bottom front rail that attaches to the cabinet bottom (already dry-biscuit) can be cut to length, remembering that the distance between the shoulders is the length of the cabinet bottom plus 1" (i.e., 1/2" MDF x 2, as used to cut the biscuit slots in the leg.)

CLOCKWISE FROM UPPER LEFT—

After all the joinery (biscuits and mortise-and-tenons) have been done on the square stock, bandsaw the legs to shape, staying outside the layout lines.

A jig for final shaping of the legs (see drawings for jig construction details).

A shaper, or a router table, is used with the jig to trim the legs to final shape.

Mark and cut mortises in the square leg blank. Set the back face of the rail flush with the back face of the leg, and the front face inset from the front of the leg. Leaving this job until now lets you make any minor adjustments to the rail thickness and to establish a safe mortise depth that doesn't penetrate through the outside face of the leg.

Bandsaw the waste from the legs. Cut one face, and re-attach the offcuts with masking tape. Cut the second face. Screw each leg back into the jig and use the shaper or router and a pattern-cutting bit to follow the profile. Extra screws may be inserted to secure the leg in the jig, but screw only into the biscuit face; the holes will be hidden later. Complete the legs by cutting the short curved inside faces at the bottom; a small card template can be made to trace around, then band-

the edge of Piece A to the face of Piece B. Mark a line along the inside of the corner on Piece B. Plot the outside profile required on Piece A. Ignore the inside curve at the bottom of the leg. The profile can be plotted directly onto the MDF, or a full-size paper template attached. Cut and smooth the curves.

Attach this shaped piece A to B with drywall screws. Cut close to the profile with a bandsaw, and finish Piece B with a router and pattern-cutting bit. The tiny rabbet on Piece A at the inside corner can be formed next—this provides a space for dust. Glue and screw the jig together with

sawn, and planed. Clean up all the machine marks and do any rounding over with hand tools in preparation for gluing the legs to side panels.

The chord of a circle can be marked at the bottom of the two side panels and the underside of the front rail. Cut and smooth these. A pattern of MDF for use

gluing in place.

The three top rails that complete the main carcass should be cut to length and carcass dovetails marked and cut, not forgetting to run a groove for the back panel in the back rail. Bore the screw holes through the dovetails that will be required at glue up. Bore screw holes

(press is convenient) to make a panel $1/2$ " thick, then three edges are rabbeted. The panel slides in from the bottom and is locked in place with three screws through it into the cabinet bottom.

DRAWER WORK

The drawer material that was previously stored can be got out and worked. True up all the drawer fronts, and size them to width and thickness. For the Häfele slides used, the following are critical dimensions:



CLOCKWISE FROM NEAR RIGHT—

The three top stretchers are set into the leg-and-side-panel assembly with dovetails.

Note the double dovetail at the front.

A leg-and-side-panel assembly, together with the lower front rail and cabinet bottom, showing joinery work.

The assembled carcass. Finish was applied to the interior prior to assembly.



with a router and pattern cutting bit, speeds the job up. Glue the legs and panels together with biscuits, using the curved leg offcuts as a clamping aid. When the glue has cured cut the sides to length on a panel saw. Use the reveal at the leg-to-panel junction as the reference point for the saw fence, shimming and packing as necessary to hold it flat and square. Chamfer the underside of the feet with a hand plane to strengthen short grain and reduce the chance of chipping off.

COMPLETING THE CARCASE

Provide channels to hold a back panel by machining a piece of wood to fit into the reveal at the side panel and the back leg. Cut it $1" \times 1/2"$, and rout a $1/4" \times 1/4"$ groove centered in it for the panel. Glue in place with some pins driven through the channel. Flush off level after

through the rails for holding down the top. A dry assembly of all the parts can be done at this stage, except that this is when the bottom rail is glued to the bottom shelf. Gluing at this point ensures that the rail overhangs the right amount at both ends. Polyurethane glue is convenient because it has a long open time, giving you chance to fiddle. Once the glue has set, dismantle the whole thing and clean up the internal parts, and apply finish after doing appropriate masking off.

Cabinets of this pattern can be glued together in two stages. First, glue in the bottom, using a couple of top rails to hold the sides apart. Check for square and winding, and then glue and screw the top rails in place one at a time. A helper or two is handy at this point. Prepare and fit a cabinet back: two pieces of $1/4"$ cherry-veneered MDF are glued together (a

• Each pair of drawer sides is $5/8"$ narrower than their matching front.

• Every drawer side is $12-1/8"$ long, and this provides for a $5/16"$ sliding dovetail into the drawer front, and for through dovetails at the back.

• A $1/4"$ wide \times $1/4"$ deep groove is worked with the bottom edge of the groove $1/2"$ up from the side's bottom edge. This groove carries the drawer bottom of veneered $1/4"$ MDF.

• Each drawer back is $1-1/2"$ narrower than its front.

• The length of every back is $1/2"$ less than the internal cabinet width (i.e., in this case $16-5/8"$ long to go into a $17-1/8"$ space.)

• All sides and backs are $1/2"$ thick.

• This information is a guide, and you should recalculate according to your circumstances.

Once all the parts are dimensioned as above, they can be used to position the drawers and slides inside the cabinet. This can best be accomplished by making a story stick or pattern of 1/2" MDF or birch ply that conforms exactly to the interior side elevation of the cabinet side. Errors in layout are easily fixed with an eraser, and some re-measuring and drawing. If your cabinet sides are solid wood, you should allow for expansion and contraction, and this is not provided for with the specific Hafele slide that I used. They can be modified by joining two rear screw holes in the slide to form a slot. With sixteen to do, as in this case, an engineering mill, if available, is convenient.

With the internal story stick (pattern) cut, start by positioning and

holes. Use a 5/32" twist or brad point bit and bore the marked screw centers. A drill press is handy, but it can be done freehand. Once all this plotting is complete, the story stick is offered up to each cabinet side and the screw holes marked through.

With this pattern of drawer, there is no runner. The weight of the drawer and its contents is carried by the bottom



marking all the drawer fronts on its long front edge, and work back into the cabinet, laying out and drawing in the position of the drawer sides and position of the drawer bottom grooves worked in these sides. Then position the bottom drawer slide on the story stick so that the top of the slide matches the position of the groove where the underside of the drawer bottom fits. The slide should be perpendicular to the story stick's front edge, i.e. parallel with the bottom edge. Mark the center of the two screw holes, one front, one back. Use a marking gauge and scribe the inset distance of these screw holes from the story sticks long edges all along the length. Next work upwards, one drawer at a time and plot the position of every slide by marking the center of the appropriate screw

which sits on the Hafele slides, and by the channel worked in the drawer sides. Drawer construction is fairly conventional. After the fronts are glued on, the dovetail housing that runs out on the bottom edge of the drawer front can be plugged with a matched, grained, dovetail-shaped piece of wood. Technically, this is unnecessary, but it's a neat touch.

Fit the drawer bottoms and insert three screws up through them into the underside of the back. The drawer back has a hole cut to capture the hook at the end of the slide. This can be drilled, but a plunge router, 1/8" bit, and side fence can also be used. If using this latter method, shim out the drawer bottom with a piece of 3/4" MDF to create a flat reference surface for the router's side fence. Holes for the pulls can be centered and drilled with

a shop-made MDF boring jig that locates positively to the drawer fronts.

Final fitting of the drawers means boring the earlier marked screw positions on the cabinet sides with pilot holes and fitting the slides. Then attach the slide locking devices to the underside of the drawer. They are attached to the back of the drawer front, approximately 1-1/8" away from the inner face of the drawer side. Cut a wood spacer this length, and attach a pair of the locking devices to a drawer with just one screw each. Test fit, and make an adjustment to the wood spacer if needed.



CLOCKWISE FROM LOWER LEFT—
A hand-held router is used for making through dovetails on the drawer backs. A carriage for the router table guides front end of drawer sides when making sliding dovetails. Drawer parts stacked in sets, with all the dovetail joinery accomplished. Partial assembly of drawer: drawer fronts were dry-fitted during glue-up of sides and back in order to ensure squareness.

Plug the original screw holes if the locking device position was found to be wrong the first time, and redrill as required.

If the drawer racks a little at the back because it's a tad too wide to fit snugly over the slides, prepare wood shims about 2" long by 9/16" wide, and thickened to suit the gap. Rub-joint them in

place at the rear under the drawer bottom. Trim flush when dry. Attach all the locking devices, and number them to correspond with the drawer number. Install each drawer starting from the bottom. Use the locking devices to make small vertical and horizontal adjustments. Some drawers may need trimming with a hand plane here and there to space all the drawers evenly.

All that remains of the construction is to complete and attach the top. Get the top out from storage, and inspect it to see how it has moved. If it's acceptable, joint

chunks off with a hand held power planer and finessing the result with hand planes. You might use a router and a bevel cutter with a bearing to start the shape. Attach the top with a 1/2" overhang (i.e., beyond the high shoulder of the leg) at the back. This means the back edge of the top will touch the wall, but the feet will miss the baseboard at the bottom.

FINISHING

Different people prefer different finishes, and a wide range of polishes would be suitable. I chose to polish with two

factor's "tung oil finish" by adding alkyd varnish and mineral spirits. The first coat of tung oil finish was applied as it came out of the can. The second coat was cut with about 15% alkyd varnish and 15% mineral spirits. The third and following coats were cut with about 30% of both mineral spirits and alkyd oil varnish. It's wiped on and buffed off fairly quickly, concentrating on one manageable area at a time. Preparing for and polishing with this mix was done both during and after assembly, as can be seen in several of the photographs. The



ABOVE, LEFT TO RIGHT—
Drawer slides mounted to cabinet sides; underside of drawer shows slide locking mechanism on drawer bottom.
Drawer work finished; note channel for housing the back panel.
Finishing the drawer fronts. A paste wood filler was used on the walnut prior to applying the topcoat.



types of finish. I will often finish all internal parts (the inside of drawers, carcass, and back panel) with pre-catalyzed lacquer, and apply an oil finish to the rest of the cabinet and drawer fronts; pure oil finishes, such as linseed or tung oil, have a rancid, musty smell if used on internal parts (such as drawers) that have no air circulation.

Spraying was done after assembly of the drawers, with lacquer masking tape and newspaper shielding the edges and front faces of drawer fronts. The back panel was finished on both sides with pre-catalyzed lacquer as well.

"Tung oil finish" marked on the can indicates that pure tung oil has been cut with varnish, mineral spirits, driers, and perhaps other components by the manufacturer. I further modified the manu-

drawer fronts, being walnut, had the grain filled prior to polishing.

The mixture I use works well in the hot humid climate I experience. Other workers, in cooler climates, might prefer to use naphtha or turpentine in place of mineral spirits to allow for faster drying and other reasons.

FINALLY

After the polishing, which entails breaking down the cabinet into its smallest parts, it's re-assembled. The last job is to apply self stick felt bumper pads to the back side of the drawer fronts, one on each end to soften the final closing action of the slides and prevent abrasion damage.

Richard Jones designs and builds fine custom furniture; he lives in Houston, Texas.

one face and edge, then thickness it, followed by ripping to width and squaring on the saw. The front edge can be straight, or curved, as it is in the example here. Mark and cut the curve if you're incorporating one. Use the "pencil in the fingers" method, or a pencil gauge, to mark the extent of the bevel on the underside on the two ends and front edge. This can be cut by tearing big